

Executive Summary

Section 503 of the Energy and Water Appropriations Act (EWA) of 2002 directed the United States Army Corps of Engineers (USACE) to “conduct and submit to Congress a study that examines the known and potential environmental effects of oil and gas drilling activity in the Great Lakes (including effects on the shorelines and water of the Great Lakes).” The House Energy and Water Appropriations Subcommittee requested that USACE initiate the study in June 2004 and full study funding was received in March 2005. This report presents a review and synthesis of existing information pertaining to the environmental and economic setting and natural resources of the Great Lakes Basin, and the potential environmental effects that oil and gas extraction beneath the Great Lakes could have on those settings and resources. This study is restricted to U.S. water and shoreline areas. It does not address or recommend any particular Federal action and is intended for informational use.

The Great Lakes, including Lakes Superior, Michigan, Huron, Erie, and Ontario are among the largest and deepest lakes in the world. The Great Lakes Basin falls in portions of Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, Pennsylvania, New York, and Canada. The Basin is important not only because of its unique and valuable natural resources (such as wetlands, fish and wildlife, cultural and archeological resources, and drinking water supplies), but also because of its large population and industrial centers, and because it serves as a major maritime transportation link. The Basin contains a wide variety of habitats that support diverse plant and animal life including more than 130 species and natural communities that have been identified as imperiled by Federal, state, and local agencies. It supports a multibillion dollar recreation and tourism industry and contains 678 state parks, 110 of which are located on coastlines of the Great Lakes. Cultural resources in the Basin include archaeological sites and historic structures present on land and underwater. Water from the Great Lakes is used for residential, farming, industrial, and energy production purposes, which account for approximately 18% of the total daily U.S. use of fresh water.

Oil and gas production includes exploration, drilling, extraction, and treatment. During exploration, geologic formations are surveyed and mapped using seismic technology to determine the formation’s potential for oil and gas production and to identify optimal drilling locations. Exploration also involves drilling exploratory wells to determine whether oil or gas production from a formation is economically feasible. During extraction, the well site is established. Well site infrastructure may include onsite disposal pits, well pads, access roads, utility corridors, and pipelines. A main borehole is drilled, its walls strengthened with metal casing, and a wellhead is installed. Wells may be vertical (drilled in a vertical line from the well pad to a deposit), slant (drilled at an angle from the well pad to a deposit), or directional (drilled vertically first and then angled to reach a deposit). Directional drilling also allows multiple deposits to be accessed from a single well pad. Potentially toxic materials may be produced during drilling that require proper containment and disposal. During treatment, naturally occurring unwanted materials or impurities (such as salt water or organic compounds) are

removed from the oil or gas. The treated oil or gas is temporarily stored at the well site before being transported offsite to a commercial refinery or a storage and distribution facility.

Oil and gas reserves under the Great Lakes have been accessed by the United States and Canada. Potential oil and gas source rocks are present beneath Lakes Michigan, Huron, Erie, and Ontario, and throughout much of the Great Lakes Basin. U.S. oil and gas production currently occurs in each of the Great Lakes Basin States except Minnesota and Wisconsin, but not under the lakes themselves. Reserves under the Great Lakes have been accessed via offshore vertical drilling and onshore directional drilling. Approximately 2,200 vertical gas extraction wells have been drilled under the Canadian portion of Lake Erie since 1913, and 13 oil and gas wells have been drilled in Michigan under Lakes Michigan and Huron from onshore locations via directional drilling since 1979. Of the three oil spill incidents reported on the Canadian side of Lake Erie since 1959, only one was directly attributed to a drilling operation. There have been no reported oil releases from subsurface formations into overlying waters during any Canadian drilling or production operations.

Potentially adverse environmental effects of oil and gas drilling under the Great Lakes may be associated with drilling and well site construction, and accidental release of oil or production wastes. Well drilling and the construction of the well site and associated infrastructure has the potential to directly impact fish and wildlife habitats by clearing land areas or disturbing lake bottoms. In some areas of the Basin, the visual intrusion of oil and gas developments could reduce the desirability of these areas for tourism and other recreational uses. Accidental releases of oil and drilling waste could incur consumption bans on fish and game, impact fish and wildlife habitats, disrupt recreation and tourism, and, depending on the proximity of water intakes, contaminate public drinking water supplies. These effects could be short or long-term in nature, depending on the location and magnitude of the release and the quality of the resource that was affected.

Some of the potential effects of oil and gas drilling may be mitigated through compliance with state and Federal regulations, restrictions, and requirements for oil and gas leases, and through the use of new technologies. State and Federal regulations require the avoidance of endangered species, recreational areas, wetlands, and unique habitats. State and Federal programs include requirements for spill prevention, reporting, and response to minimize the likelihood, magnitude, and effects of accidental spills. As drilling technology advances, it may be possible to access more gas deposits from fewer well locations than is currently possible. In addition, new advances in spill containment may further reduce the number and severity of oil and gas releases by minimizing the potential for accidental spills and by promoting rapid containment and cleanup.